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BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Application Number: 09/996,301
Filing Date: November 21, 2001
Appellant(s): SIROHEY ET AL.

Patrick S. Yoder
For Appellants

EXAMINER'S ANSWER

This is in response to the appeal brief filed 1/17/2006 appealing from the Office action mailed

6/29/2005.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

- The statement of the status of all the claims in the proceeding (e.g., rejected, allowed or confirmed, withdrawn, objected to, canceled) contained in the brief is incomplete. A correct statement of the status of the claims is as follows: Claims 1-70 are rejected.

- The identification of those claims that are being appealed is correct: Claims 1-15, 17-34, 36-46, 48-53, and 62-70 are currently under final rejection and, thus, are the subject of this appeal.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,763,139   **ANDREW**   7-2004

(9) Grounds of Rejection

- With regard to first ground of rejection, in which claim 17 was rejection under 35 U.S.C. 112, First Paragraph, the Appellants' argument is persuasive. The Examiner withdrew the rejection.

- With regard to second ground of rejection in which claims 1-15, 17-34, 36-46, 48-53, and 62-70 were rejected under U.S.C. 102(e), the following ground(s) of rejection are applicable to the appealed claims:

1.   Claims 1-15, 17-34, 36-46, 48-53, and 62-70 are rejected under 35 U.S.C. 102(e) as being anticipated by Andrew (US patent 6,763,139 cited previously.)

a.   For Claims 1-15 and 17-18, Andrew teaches a method for handling image data, the method comprising:

-- decomposing the image data into a plurality of data sets using lossless wavelet decomposition, wherein decomposing the image data using lossless wavelet decomposition comprises creating a hierarchical set of sub-bands, one set comprising a low frequency component at a lowest resolution level and remaining sets comprising high frequency components at successively higher resolution levels; (column 5, line 7 to column 6, line 11; column 10, lines 23-37; step 103 of Fig. 1; The DWT decomposition can be exactly (lossless) reconstructed.)

-- tessellating at least one decomposed set of the plurality of data sets into a plurality of blocks; (column 6, lines 12-23; Each decomposition is divided into tiles.)

-- compressing each tessellated block of the plurality of blocks using lossless compression; (column 6, line 23 to column 7, line 33; The entropy encoding and Huffman encoding are lossless.)

-- compiling a data stream comprising the compressed plurality of blocks arranged sequentially in a desired order based upon the decomposition and tessellation; (column 8, lines 4-13)

-- wherein the lossless wavelet decomposition comprises lossless integer wavelet decomposition; (column 10, lines 24-37; The transform coefficients are in integer representation.)

-- wherein tessellating comprises using a fixed block size for the plurality of blocks; (column 6, lines 12-23)   `

-- wherein tessellating comprises addressing each tessellated block with a tessellation index for each dimension of tessellation; (column 6, lines 58-64)

-- wherein addressing comprises providing a decomposition level index for identifying a desired set of the plurality of data sets; (column 6, line 65 to column 7, line 3; column 8, lines 4-12)

-- selectively transmitting at least a portion of the data stream, wherein selectively transmitting comprises selecting the portion based upon a desired set of the plurality of data sets and a desired group of the plurality of blocks encompassing a region of interest and wherein selecting the portion comprises identifying the desired set and each tessellated block of the desired group using an addressable function; (column 9, lines 22-55; The image data of the selected tiles are transmitted to the decoder for decoding based on the selected resolution and

tiles associated with the selected region. The pointer information provides the addressable function.)

-- wherein the data stream comprises a header, which comprises characteristics of the decomposition, the tessellation, and the compression; (column 8, lines 29-48; column 9, lines 13-21, 36-43; The pointer information comprises characteristics of the decomposition and the tessellation.)

-- wherein the data stream comprises a resolution level index for each decomposed set, a tessellation row index for each tessellated block, and a tessellation column index for each tessellated block; (column 8, lines 29-48; column 9, lines 13-21, 36-43; The pointer information inherently needs the labeling information shown in column 8, lines 7-10 for the resolution and tile address to point to the starting point of each tile.)

-- wherein the desired order comprises an order of desired blocks of the tessellated blocks; (column 8, lines 7-10; The sequence shows an order of desired tiles for each decomposition. For example, HL3(0,0) is placed before HL(0,1). Without specified what desired blocks are, the listed tiles are all desired tiles for future decompression.)

-- storing the data stream based on indices to the decompositions and tessellations, wherein storing the data stream comprises storing each of the compressed plurality of blocks in data groups based on the indices; (column 8, lines 7-10; column 16, lines 57-63; The sequence shows the storing sequence based on the indices. For example, DC90,0) and HL3(0,1) are stored as individual groups, respectively.)

-- wherein the plurality of data sets corresponds to a plurality of resolution levels; (column 8, lines 7-10; DC represents one level. HH3, HL3, LH3 represent another level.)

-- reconstructing an image at least partially from the tessellated blocks; (column 9, lines 22-55)

-- dividing each tessellated block into subregions to be individually compressed based upon entropy of each subregion. (column 11, lines 49 to column 12, line 10; blocks 814, 818, and 820 of Fig. 8; At step 814, when a region is insignificant according to eq(1) of column 11, the value of the considered bit plane in the region is uniformly zero, thus having a low entropy. A set of single-value data has entropy of zero. So the decision at step 814 is inherently entropy-based. When the set of the data of the bit plane in the region has at least one non-zero, namely the entropy is not zero, the region is further divided.)

b.   For Claims 19-30, Andrew further teaches:

-- wherein transmitting the data stream comprises transmitting at least part of a desired one of the data sets identified by the decomposition level index, the desired one corresponding to an image resolution relatively higher than a locally stored one of the data sets; (column 8, lines 7-10; The sequence is arranged in the order of degree of resolution.)

-- wherein transmitting comprises transmitting over a network. (column 15, lines 53-64; column 16, lines 57-64)

After comparing Claims 1-15 and 18 and Claims 19-30, it is evidently that the combination of the above cited passages and the passages recited for teaching Claims 1-15 and 18 as discussed above also teaches Claims 19-30.

c.   For Claims 31-34 and 36-37, Andrew further teaches:

-- wherein the plurality of resolution levels comprise a lowest resolution level having a low frequency component and a remaining plurality of resolution levels comprising high frequency components; (Fig. 2; column 8, lines 7-10; DC is a lowest resolution level having a low frequency component. The others are the high frequency components.)

-- wherein tessellating at least part of one level comprises tessellating only the high

frequency components. (Andrew's teaching includes a special case where the lowest DC band

contains only a single pixel. For example, when a 128 x 128 image is decomposed into 7

resolution levels. The highest level is DC having one single element. The HL6, LH6, and HH6

also all have a single element. A single element cannot be tessellated.)

After comparing Claims 1-15 and 18 and Claims 31-34 and 36-37, it is evidently that the

combination of the above cited passages and the passages recited for teaching Claims 1-15 and

18 as discussed above also teaches Claims 31-34 and 36-37.

d.   For Claims 38-46, and 48, Andrew further teaches:

-- wherein the plurality of resolution levels comprise a lowest resolution level having a

low frequency component and a remaining plurality of resolution levels comprising high

frequency components; (Fig. 2; column 8, lines 7-10; DC is a lowest resolution level having a

low frequency component. The others are the high frequency components.)

-- wherein forming the data stream comprises providing a header having decomposition

statistics and tessellation statistics for the plurality of addressable data blocks. (column 8, lines

29-48; column 9, lines 13-21, 36-43; The pointer information comprises information of Bytes of

tile and triplet of tiles that are statistics related to the tessellation and the decomposition,

respectively.)

After comparing Claims 1-15 and 18 and Claims 38-44, 46, and 48, it is evidently that the

combination of the above cited passages and the passages recited for teaching Claims 1-15 and

18 as discussed above also teaches Claims 38-44, 46, and 48.

e.   Claims 49-53 and 62 are the corresponding systems of method described in

Claims 1-15 and 18. For Claims 49-53 and 62, Andrew teaches a system (Fig. 12) to implement

the methods of Claims 1-15 and 18-30, comprising:

-- an interface comprising circuits that are modules for performing functions of

decomposition, tessellation. addressing blocks, compression, storage control, ordering data, and

transmitting desired portions described in Claims 1-15 and 18-30;

-- a memory device configured to store the plurality of addressable data blocks. (column

16, lines 57-64)

After comparing Claims 1-15 and 18-30 and Claims 49-53 and 62, it is evidently that the

combination of the above cited passages and the passages recited for teaching Claims 1-15 and

18-30 as discussed above also teaches Claims 49-53 and 62.

f.   Claims 63-70 are the corresponding computer programs of method described in

Claims 1-15 and 18-30. For Claims 63-70, Andrew teaches a machine-readable medium with

computer algorithms (column 15, lines 28-52) to implement the methods of Claims 1-15 and 18-

30.

After comparing Claims 1-15 and 18 and Claims 63-70, it is evidently that the

combination of the above cited passages and the passages recited for teaching Claims 1-15 and

18-30 as discussed above also teaches Claims 63-70.

(10) Response to Argument

1. Appellants' argument --

The Andrew reference does not disclose lossless wavelet decomposition, because

Andrew's teaching does not enable exact reconstruction of a wavelet transform. (1) Appellants

argued that Andrew's Haar Transform (which employs a floating point scheme) can only provide

for an exact reconstruction if, by complete chance, the numerical values in the Haar transform

are precise even numbers (so, therefore, the truncation causes only a loss of zero decimal values).

(2) Appellants further argued that the Andrew reference clearly does not enable the use of the

Haar transform to provide for an exact reconstruction, accidental or otherwise. Instead, Andrew

mentions the use of the Haar transform as an aside in a single sentence with no disclosure as to

how to utilize or modify such a transform to reliably provide for full reversibility.

Examiner's answer --

With regard to point (1) above, the Appellants cited many Andrew's passages of teaching

floating-point wavelet transform. That is irrelevant to Examiner's evidence. The Examiner cited

the passages in column 5, line 7 to column 6, line 11 and column 10, lines 23-37 to teach lossless

wavelet decomposition. Especially in column 6, lines 7-11, Andrew teaches one species having

exact reconstruction of discrete wavelet transform (DWT) using Haar basis set. An exact

reconstruction means no loss of data. That requires every step including DWT to be lossless. The

passages of Andrew in column 5, line 7 to column 6, line 11 and column 10 teach both

embodiments having lossy and lossless wavelet decompositions. It is the teaching of the one

selected to be able to have always-exact reconstruction meets the requirement of "lossless

wavelet decomposition". Andrew does not refer to the one having exact reconstruction as a lossy

one which accidentally has a lossless result.

With regard to point (2) above, the Appellants argued, from the last paragraph of page 8

to the second paragraph of page 9 of this Brief, a Haar basis set can only accidentally provide for

an exact reconstruction. The Appellants implicitly concluded that exact-reconstruction of Haar

transform is not enabled in Andrew. However, in the third paragraph of page 9 of this Brief, the

Appellants also admitted that "lifting" of the Haar transform (and other wavelet transformation)

gives an integer-based transformation with full reversibility. Because a "lifted Haar transform" is

a kind of Haar transform, exact-reconstruction Haar transform is enabling. Furthermore, exact-reconstruction Haar transform is not against any physical or mathematical law or rule. Actually, exact wavelet reconstruction, including a "lifted Haar transform", is well known to one with ordinary skill in the art of image wavelet transform. Just mentioning wavelet transform with exact reconstruction is adequate to enable said one to implement the step. It is the same as mentioning DCT to said one.

2. Appellants' argument --

The Andrew reference does not disclose lossless integer wavelet decomposition. Andrew reference discloses a quantization or floating point decomposition. See, e.g., column 18, lines 21-64.

Examiner's answer --

First, the Examiner likes to point out that quantization is irrelevant to wavelet decomposition, because the recited feature is lossless integer lossless integer wavelet decomposition, The quantization can be performed before or after the decomposition. What we focus here is whether the wavelet decomposition is a lossless integer wavelet decomposition or not. The passage in column 18, lines 21-64 of Andrew cited by the Appellants is silent about floating point decomposition. The Examiner did not see any relevance of the cited passage with "floating point decomposition."

The passage of Andrew in column 10, lines 24-37 teaches that the transform coefficients are in integer representation, indicating the decomposition in related to integer and therefore is an integer wavelet decomposition. As the Examiner discussed above, Andrew in column 5, line 7 to column 6, line 11 and column 10, lines 23-37 to teach lossless wavelet decomposition.

Therefore, when the embodiment of the lossless wavelet decomposition is implemented with in

the integer format, it is a lossless integer wavelet decomposition. If the Appellant would define a

lossless integer wavelet decomposition differently, they should spell it out explicitly in the

claims.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Wenpeng Chen

March 27, 2006

Conferees:

Matthew Bella

Joseph Mancuso